# SPECIFICATION

Docket No. 0544MH-36340

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TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN that I, John Fors, residing in the State of California, have invented new and useful improvements in a

**SYSTEM FOR PLANNING A NEW PRODUCT PORTFOLIO**

of which the following is a specification:

## ~~CROSS-REFERENCE TO RELATED APPLICATIONS~~

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The present application claims the benefit of US Provisional Application 60/158,654, filed 8 October 1999, titled INTEGRATED SYSTEM FOR CONSTRAINT-BASED PORTFOLIO AND PIPELINE OPTIMAZATION, which is hereby incorporated by reference. It also contains material in common with co-pending US utility applications No. _______________, attorney Docket No. 0544MH-36339, titled SYSTEM FOR SCHEDULING PRODUCT PLANNING, and No. _______________, attorney docket No. 0544MH-36338, titled SYSTEM FOR PLANNING A NEW PRODUCT RELEASE, both filed concurrently herewith, and ~~both hereby~~ incorporated by reference.



## BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention relates generally to planning systems, and more particularly to a system and method for planning a portfolio of new products to be developed.

2. Description of the Prior Art:

In today's marketplace, development of new products to be brought to market is becoming of increasing importance. In many industries, product life cycles are becoming shorter, increasing the importance of new product planning

and introduction. Planning of new products is usually based upon a decision by management as to what new products will sell the best, and hopefully provide the best profit margins for the company.

~~It is difficult for a company to determine whether it is selecting the best mix of new products to be developed. Because of shorter product lifetimes, the development process itself must be carefully planned so that new products can be brought out in a timely manner. Bring out new products too late can have a devastating impact on a company's profit margins.~~

Previously, there did not exist adequate tools to assist corporate management in planning and defining a proper portfolio of new products to be developed. Most companies know what current products are doing well, and which are contributing to the corporate profits, but have less knowledge about which new products under consideration will best contribute to profits in the future.

Planning systems can be used to plan for product development and allocate resources. However, the impact on profits of developing different possible combinations of new products is generally unknown. Because timing considerations can have such a great impact on overall profitability of a new product, timing of its introduction is of primary concern. Present planning tools available to corporate planners do not allow the impact on future profits to be determined for different scenarios for introducing new products.

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~~It would be desirable to provide a system and method for planning development of new products that could consider the impact of product development schedules on product profitability. It would be further desirable for such a system to enable planners to a cost of product development as well as impact on future profits.~~

## SUMMARY OF THE INVENTION

In accordance with the present invention, a planning system for developing new products includes resource and projected financial performance information as inputs. By selecting various combinations of possible new products to develop, a planner can determine a product mix that maximizes future profits as well as can actually be implemented using available resources. A product development schedule is generated along with projected financial information.

## BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a diagram outlining a preferred new product planning process;

Figure 2 is a high level block diagram illustrating a preferred approach to new product planning;

Figure 3 is a diagram illustrating the use of alternative projects for developing a product;

Figure 4 is a diagram illustrating a plurality of tasks contained in a project;

Figure 5 is a diagram illustrating a project having tasks organized in phases;

Figure 6 is a sample set of financial projections over time; and

Figure 7 is a data flow diagram illustrating utilization of the preferred planning system.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The system and method described below is useful for planning the development of new product portfolios to be developed. In order to assist a planner in determining an optimum mix of new products, resources and financial results must both be considered. If a new product development project is later than planned, significant loss of potential profits may occur. Therefore, the process for scheduling new product development must include such financial information in order to obtain the best results. A preferred system for assisting planners in their task is referred to herein as a portfolio planner, that is, a system to assist in planning a portfolio of new products to be developed.

~~Figure 1 illustrates the planning process generally at a high corporate level. The portfolio planner system resides on a server 10 which is accessed directly or indirectly by the various people involved in the planning process. Those people include program managers and resource managers 12 who preferably access the server 10 through one or more web servers 14. program managers and resource managers 12 access a login web page 16 that gives them access to the underlying web pages 18 used to manipulate data and generally access an underlying database 20.~~

Portfolio analysts 22 access the portfolio planner server 10 through various scenario building tools 24 not available to program and resource managers 12. A portfolio team 26 makes final decisions as to which products are to be developed,

and determines the various high level strategies to be implemented. They are assisted in their decision making by the analysts 22. It will be appreciated by those skilled in the art that this division of work is only a preferred suggestion, and other high level relationships will work with the system described below.

Figure 2 indicates the type of information used by the system to develop an optimum portfolio. Planning engine 28 accepts inputs and generates development plans as described below. Users 30 both provide initial inputs to planning engine 28, and assess results that are generated. Planning engine 28 uses various types of data as inputs, and modifies data as the planning process proceeds. Data regarding projects 32 is used to define what steps are necessary to develop each new product under consideration. Data regarding the resources 34 available to develop new products is required, as is information regarding the financial models 36 that project the impact on profits of developing each product by a set of introduction dates.

A feature that adds to the usefulness of this system is that forward looking financial models are incorporated into the development planning strategy. Because late product introduction can have such a devastating impact on the profit contribution made by a product over its lifetime, it is necessary to consider timing effects in order to develop a useful product development plan. As is discussed in more detail in connection with Figure 6, the present system provides that different profit projections be provided for various new product introduction dates.

Some portions of the preferred system are similar in nature to planning systems known in the art. Various portions of the preferred system are described in connection with Figures 3 through 5.

Referring ~~to Figure 3, each product under consideration for~~ development may be developed by one or more alternate projects. In this example, Project A can be developed by a project X 40, which is currently selected as the active project for this project. Only one development project is planned for any single project, to prevent different development projects for a product from being pursued simultaneously. Portfolio planners can select alternate projects, such as project Y 42 or Project Z 44, to assess the impact on overall profitability and scheduling of these alternate projects, ~~but only one project at a time is selected.~~

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Referring to Figure 4, any given project 46 is comprised of a sequence of tasks. A simplified sequence of tasks 48 – 58 is shown in Figure 4, and assumes that two components are needed to be developed to come up with a new product. In many cases, many of the components in a new product can be reused from earlier products, and integrating them is the primary concern.

Tasks have constraints that are used to sequence them for planning purposes. Some tasks must be completed before others, and a set of constraint rules is provided to enforce the proper ordering. Other tasks can be complete in parallel, with component development not depending on the development of some of the other product components. These relationships are expressed as a set of constraint rules for each project. The Planning engine enforces these constraints

when scheduling development of products. The constraints are especially important when multiple products are being scheduled for concurrent development, which is the most common scenario in which the present system is useful.

Projects may be broken down into phases, which are simply collections of related tasks as defined by those using the system. Referring to Figure 5, a product A 60 is to be developed through project X 62, which in turn consists of tasks 64 – 72. These tasks are shown as broken into 3 phases 74, 76, 78, which occur in sequential order. In a planning situation where it is presumed in advance that not all development projects will proceed to completion, the use of project phases can enhance the accuracy of the portfolio projections.

Each task requires certain resources. These can be defined as, for example, a certain number of person days to be made available during a specified timeframe by a specified resource. Each resource has a capacity, defined as the number of person days which are available. This capacity can change over time, and in particular can change depending upon the day of the week, the amount of overtime that can be worked, the impact of holidays, etc. The process of scheduling projects involves scheduling tasks, which uses up available resources. As schedules are developed, the available resources diminish.

When there is a possibility that a project will not be completed, a probability of completion can be assigned in advance to each phase of the project. For example, it can be assumed that the initial phase 74 of the project is 100% likely to be performed. Whether product development continues will depend on the results

of the first phase, and a probability of 80% can be assigned, for example, to second phase 76. In this example, assume that the probability of executing the third phase 78 is 50%, once the second phase is completed.

The resources that will be used by project 62 are multiplied by the appropriate probabilities when resource allocation is performed at the planning stage. Thus, the resources that would be needed by the second phase 76 are multiplied by 0.8 to take into account the lesser probability that they will be needed at all. For the third phase 78, the required resources are multiplied by 0.8 * 0.5 = 0.4, because the third phase depends on both a decision to be made after second phase 76 completion (50%) and the probability that the second phase will be performed (80%). The resources normally required for each phase are multiplied by the product of all preceding phase probabilities to reach a resource allocation multiplier for that phase for planning purposes.

An important part of the preferred system is the inclusion of financial modeling in the product development planning process. As described above, expected profits over the lifetime of a product are a function of the introduction date of the product, as well as numerous other factors. In general, creating a model projecting the financial return to be expected for a product is known in the art. The preferred system requires that a series of financial projections be run in order to assist the planning process.

Figure 6 illustrates a simple example of the time element as it relates ~~to the profit projections used in the preferred embodiment.~~ A graph 74 includes three

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profit curves 76, 78, 80 which are shifted in time to represent different product introduction dates. IN this example, the peaks of the curves diminish as the product is introduced later. At some point, there may be only minimal profits if the product is introduced too late. The total profits over the lifetime of a product is found by integrating under the separate profit curves.

Each possible product introduction date will have a corresponding overall profit figure associated with it. Some products may be relatively insensitive to the date of introduction; these products can be developed to be introduced an any convenient time. Other products are extremely time sensitive, and must be developed as quickly as possible. The time impact on product contribution to corporate profits is used as part of the data considered in the optimization process.

The portfolio planning process is a process of optimizing a set of inputs to maximize an output value. In the preferred system, the output to be maximized is the overall profit to be made by products to be developed. This is shown in Figure 7, in which a planning engine 90 generates an output financial projection 92 consisting of the expected profit to be generated by a given product mix 94. Product mix 94 is provided as an input to planning engine 90, and defines the products that are in the portfolio and available for consideration. Data defining available resources 96, project definitions 98, and time dependent financial projections 100 are also provided.

As described above, resources 96 is a list of all available resources needed to develop new products. Not all resources available to the company need be

considered; only those that relate to new product development are of interest. Project definitions 98 are the list of tasks required to develop each possible product, as described above. The financial projections 100 are also as described above. Project definitions 98 and financial projections 100 are provided separately for each possible product to be developed. Resources 96 includes all resources that are available.

The planning process begins when a possible portfolio of new products is provided as the product mix 94. Planning engine 90 generates a schedule 104 for product development in the traditional manner, utilizing the sequence and timing constraints contained in the project definitions. Development projects are scheduled utilizing available resources, and the completion dates for the various projects under consideration generates a dollar number for each product based upon introduction date. Part of the scheduling process is the selection of which products are to be developed; this list is preferably chosen to maximize overall projected profit. A user determines whether the financial result and plan is suitable, and may change the product mix if necessary. The planning process is an open loop process, with the user changing the portfolio in order to determine the impact on overall profitability.

As is normally the case, the scheduling process balances weighted interests to generate a best overall schedule according to its inputs. The present system uses financial projections, which differ depending on introduction date, as a weighted factor in the optimization process. Thus, products which lose significant

profitability if they are introduced late are more likely to be scheduled for fastest introduction, while less time sensitive products may be scheduled later. Of course, those products that contribute the most to profitability have a priority in the scheduling process.

In addition to the projected profit number 92, the present system also generates a schedule to control the development process. This schedule is used by project managers to determine their deadlines so that overall corporate schedules and profit targets can be met.

The described system and method include time sensitive profit projects as an integral part of the portfolio planning process. This ensures that not only will all development projects occur in a timely manner, but that those that contribute the most to corporate profits are emphasized. The ability to select the proper portfolio of products to be developed can provide a significant strategic advantage to companies that must constantly introduce new products.

While the invention has been particularly shown and described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention.